

SEVERE LOCAL STORMS, NOVEMBER, 1923.

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the annual report of the chief of bureau.]

Place.	Date.	Time.	Width of path (yards).	Loss of life.	Value of property destroyed.	Character of storm.	Remarks.	Authority.
Bayou Little Caillon, La. (16 miles south of Houma, La.).	28	9 p. m.	.....	5	.....	Tornado.....	Several dwellings destroyed and also a school building valued at \$25,000; considerable damage to crops; several persons injured.	Official, U. S. Weather Bureau.
New Orleans, La.....	28	10:15 p. m.	.....		\$20,000	Wind.....	1 residence demolished and several others damaged.	Do.
Latham, Ala. (1 mile north of).	29	8 a. m.	.....	1	12,000	Tornado.....	2 persons injured; several buildings demolished and many trees uprooted or twisted off.	Do.

STORMS AND WEATHER WARNINGS.

WASHINGTON FORECAST DISTRICT.

By EDWARD H. BOWIE, Supervising Forecaster.

The month of November gave no wind and weather conditions out of the ordinary for this month in the Washington Forecast District. The number of storms which crossed the eastern half of the country was not in excess of the normal, and few of these were other than disturbances of moderate intensity. There were no cold waves, which is exceptional, for scarcely a November passes without the necessity of displaying cold-wave warnings in some part of the district. Frosts were frequent, however, and occurred in all parts of the district except southern Florida. Perhaps the notable feature of the month was the number of well-developed areas of high barometric pressure which crossed the district, but as these were HIGHS that came eastward from the far West, many coming into the country from the Pacific Ocean, they were not attended by the pronounced and rapid falls in temperature associated with the HIGHS that come down from Canada.

Storm warnings were displayed during the month as follows: Small craft warnings on the 2d and 3d for the Mobile and Pensacola storm warning districts and on the 4th for the Atlantic coast at and between the Virginia Capes and Cape Hatteras, advisory warnings on the 6th for the Middle Atlantic and New England coasts followed by the display of storm warnings on the 7th at and between the Virginia Capes and Eastport, Me.; northeast storm warnings on the 12th at and between Delaware Breakwater and Cape Hatteras and these were continued on the 13th at and between the Virginia Capes and Cape Hatteras; northeast storm warnings were displayed on the 23d along the coast at and north of Delaware Breakwater and these were continued on the 24th at and north of Boston, Mass.; small-craft warnings on the 29th for the Mobile and Pensacola districts; and on the 30th, southeast storm warnings were displayed on the Atlantic coast at and north of Delaware Breakwater. Practically all of these warnings were verified, although in no instance did a storm of marked severity occur. Of the storms that did occur the one on the 6th and 7th, which came northeastward from the east Gulf coast as a moderate disturbance and then after reaching New Jersey increased greatly in intensity, and that of the 24th which developed over the Middle Atlantic States on the night of the 23d, were the most important. In both of these instances, the development of energetic disturbances in the troughs of low pressure between two HIGHS (one to the east or northeast and the other to the west or northwest of the places where these developments took place) were the preliminary pressure situations previ-

ously to the increase in intensity of these two disturbances. The display of warnings on the 12th was in connection with the rapid development and southward movement of an area of high barometric pressure from the New England States at a time when the barometric pressure was low off the Middle Atlantic and South Atlantic coast, a disturbance developing in this region of low air pressure on the 14th and moving east-northeastward, the pressure falling to 29.56 inches at Bermuda on the 15th. The display of warnings on the 30th was in connection with a disturbance which developed over the Gulf of Mexico, moved thence up the Mississippi Valley to the region of the Great Lakes and thence east-northeastward down the St. Lawrence Valley with diminished intensity. In addition to the advices sent to ports, all advices concerning the position, intensity, and the direction of movement of these storms, together with expected winds and weather, were broadcast to ships at sea through naval radio.

CHICAGO FORECAST DISTRICT.

In the Chicago Forecast District November, 1923, was virtually free from atmospheric disturbances of severity. While it was necessary to issue storm warnings for the Great Lakes on several occasions, and a few cold-wave warnings for the northern States of the district, yet in no instance did the ensuing conditions become intense.

Storm warnings.—Northwest storm warnings were issued on the morning of the 7th, for Lakes Huron, Erie, and Ontario, and small-craft warnings for northern Lake Michigan and extreme eastern Lake Superior. At that time a disturbance that had developed off the Middle Atlantic coast during the preceding 24 hours was central over Massachusetts. Within the same period a substantial increase in pressure had taken place over the northwestern upper Lake region with the result that a rather pronounced gradient existed from that section eastward to the storm center. The disturbance moved northeastward on the 7th with a still further development, and strong winds or moderate gales occurred over most of the area where warnings were displayed.

No further storm warnings were needed until the 19th, but in the meantime small-craft warnings were advised on the 10th for the lower Lakes, Lake Huron, and eastern Lake Michigan, on the 16th for Lake Huron, eastern Lake Michigan, and eastern and central Lake Superior, and on the 17th for the same districts as on the 16th, excepting southeastern Lake Michigan, for disturbances of moderate character that were expected to affect the sections in question. On the night of the 19th a disturbance from the Northwest was moving rapidly southeastward over Manitoba with increasing energy and a central pressure of 29.44 inches. Accord-

ingly, southwest warnings were issued for Lake Superior and northern Lake Michigan, and on the following morning the warnings were extended to include the remainder of the Great Lakes. The center of the storm passed eastward just to the north of the Lakes on the 20th, with gradually decreasing energy. Within the period covered by the warnings strong winds occurred rather generally, with verifying velocities at about one-half the stations.

The next disturbance to call for warnings was central on the morning of the 23d, over Ohio. At that time but little energy was evident, but the pressure in and near the center of the storm was decreasing rapidly. Small-craft warnings were advised for Lakes Erie and Ontario. Noon special observations, however, indicated a marked increase in intensity, Erie, Pa., reporting a wind velocity of 48 miles an hour from the southeast, and a 2-hour pressure fall of 0.14 of an inch. Therefore, southeast storm warnings were substituted for the small-craft warnings on Lake Ontario and on Lake Erie from Erie, Pa., eastward. The warnings were lowered a few hours later, however, the night reports indicating that the disturbance was losing energy. No verifying velocities other than that referred to in the foregoing were reported.

On the morning of the 25th a disturbance from the Northwest was central in northern Minnesota with increasing strength. Small-craft warnings were then issued for Lake Superior and northern Lake Michigan, but at 2 p. m. northwest storm warnings were substituted. At night the warnings were extended over the remainder of the Lakes, southwest warnings being displayed on the Lower Lakes. The storm continued its eastward movement, but it lost energy after the morning of the 26th. Generally speaking, the warnings were verified on the Upper Lakes, but on the Lower Lakes only fresh to strong winds occurred.

Another disturbance from the Northwest was central over northern Manitoba on the morning of the 28th and it appeared to call for southwest warnings on Lake Superior and the northern portions of Lakes Michigan and Huron. Accordingly, these were issued. The warning was verified in part, moderate gales being reported from central Lake Superior.

The final storm warning for the month was issued on the 29th for a disturbance that had moved up the Mississippi Valley from the Gulf of Mexico to a position central on the morning of that date near Memphis, Tenn., and with a marked increase in intensity. At 2 p. m. northeast warnings were issued for Lake Michigan, and southeast warnings for Lake Huron. At night the warnings were extended over the Lower Lakes, southeast warnings being displayed. This storm moved north-northeastward from Memphis. As it reached the Lake Region the disturbance decreased in intensity, but it caused gales over portions of Lake Erie on the night of the 29th-30th.

Cold-wave warnings.—Coldwave warnings were issued as follows: On the 20th, for North Dakota, northern Minnesota, northern and eastern upper Michigan, and extreme northern lower Michigan; on the 25th, for North Dakota and northwestern Minnesota; and on the 30th, for Montana, Wyoming, the Dakotas, and northern Minnesota. For the most part these warnings were verified but, as indicated in the first part of this report, the cold was not severe.

Frost warnings.—Frost warnings were issued on a number of dates until the 21st for southeastern Kansas. The frosts that occurred were apparently of little economic importance.

Stock warnings.—Warnings for stock interests were issued on the last day of the month for the Dakotas, western Nebraska, Montana, and Wyoming in connection with the expected occurrence of snow and much colder weather in those States. In general, ensuing conditions were as predicted; however, little or no snow fell in South Dakota and western Nebraska.

Forecasts for the benefit of beekeepers in this district were begun on a small scale. The necessary arrangements were not completed until near the middle of the month and only one special forecast was issued. It is understood that plans are under way to extend this forecast service to the entire country where it is not already in operation. The work is being carried out by the American Honey Producers' League with headquarters at Madison, Wis. The particular information desired by those in the Chicago district is a forecast in November of a day or two with a temperature of 50° or higher and clear weather, followed by cloudy and colder.—C. A. Donnel.

NEW ORLEANS FORECAST DISTRICT.

Moderate weather conditions prevailed over this district during the month. Frost or freezing warnings were issued for interior portions of the district on the 3d, 4th, 5th, 6th, 7th, 15th, 16th, 17th, 19th, 21st, and 26th. Livestock warnings on the 27th were issued for snow for Oklahoma and the northern portion of west Texas, and Amarillo, Tex., reported 9.0 inches of snow on the ground on the 28th.

Small-craft warnings were displayed on the Texas coast on the 1st, 2d, 26th, 27th, and 28th, and northeast storm warnings for the Galveston section on the 28th, all of which were justified. No storm occurred without warning.—I. M. Cline.

DENVER FORECAST DISTRICT.

During the greater part of the month, areas of high pressure occupied the middle portion of the Rocky Mountain region, with frequent Lows of considerable intensity passing across western Canada and the upper Missouri Valley and occasional disturbances moving eastward along the southwestern border. A storm of marked intensity that appeared over southern California on the 9th moved rapidly northeastward during the 10th and 11th and was attended by general precipitation in all portions of the district except eastern Colorado, with occasional excessive downpours in Arizona on the 10th.

A moderate cold wave, without warning, occurred in southeastern and extreme eastern Colorado on the 26th, due to the passage of an area of relatively high pressure across that portion of the State. Local cold waves, also without warning, occurred at Pueblo on the 21st and 28th.

Frost warnings were issued as follows: 2d, southern New Mexico and southeastern Arizona; 3d, southern New Mexico, heavy to killing northwestern Utah; 4th, heavy northern Utah; 5th and 6th, south-central and